Wi-Spy
Troubleshoot. Analyze. Optimize.

User's Guide

1. Getting Wi-Spy

The Wi-Spy software application is included on a CD-ROM when you purchase Wi-Spy hardware, or you can download the application at http://www.metageek.net/wi-spy/support.php. Wi-Spy requires Microsoft's .Net framework 1.1 or higher in order to run (the .Net framework requires Internet Explorer version 5.01 or higher). To learn more about Microsoft .Net framework go to: http://msdn.microsoft.com/netframework/downloads/framework1_1/.

2. Installing Wi-Spy

The Wi-Spy installer installs files into a single folder in your Program Files directory (the default installation folder is C:\Program Files\MetaGeek\Wi-Spy). A shortcut folder is also created in your Programs folder; this folder is called Wi-Spy and contains links to Wi-Spy.exe and the user documentation. You have the option when installing to allow all users of the computer to access Wi-Spy, or only the current user. If the .Net Framework 1.1 has not previously been installed the Wi-Spy installer should prompt you to download and install the .Net Framework before continuing with the Wi-Spy installation.

Installing Wi-Spy from CD

If autorun is enabled on your CD drive insert the Wi-Spy CD and select "Install" when the startup screen appears (if autorun is not enabled navigate to your CD drive in Windows Explorer and run Startup.exe).

3. Running Wi-Spy

To run Wi-Spy, plug the Wi-Spy dongle into an available USB port and click on the Wi-Spy shortcut in Start? Programs? Wi-Spy. Wi-Spy enumerates as a generic USB Human Interface Device (HID), so special drivers are not required. The first time Wi-Spy is plugged into a computer the enumeration could take up to twenty seconds; subsequent enumerations usually only take a couple seconds. When enumeration is complete a green LED in the dongle will illuminate and the Dongle Enumeration Indicator in the bottom left corner of the Wi-Spy software will light up. There is no software configuration or registration required.

4. Running Wi-Spy from CD

Wi-Spy can run directly from the CD without running the installer. This option is useful if you are troubleshooting someone else's network and are not using Wi-Spy on your own machine. If autorun is enabled on your CD drive insert the Wi-Spy CD and select "Run From CD", when the startup screen appears (if autorun is not enabled navigate to your CD drive in Windows Explorer and run Startup.exe). The application can also be copied to removable USB storage media if desired. Wi-Spy will not run directly from the CD if the Microsoft .Net Framework 1.1 has not been installed.

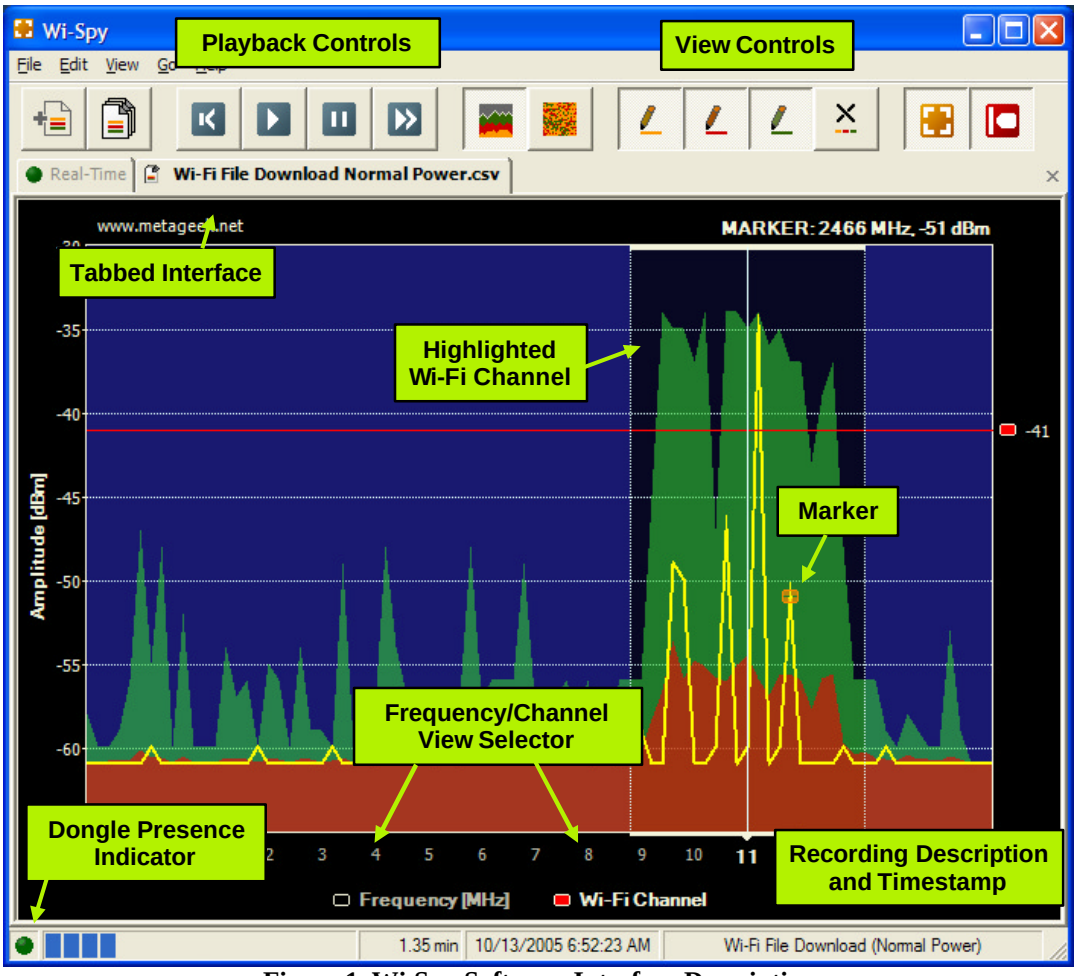

Figure 1. Wi-Spy Software Interface Description

5. Analyzer View ( )

By default all three traces (data, average, and maximum) are displayed on the graph. You can enable/disable the frequency marker or any of the traces from the toolbar, the View menu, or via keyboard shortcuts. The average and maximum traces can be reset by clicking the Clear History ( ) button. If the marker is enabled, the frequency and amplitude of the current marker position is displayed at the top right corner of the graph. The marker can be moved left or right by dragging it with the mouse or via keyboard shortcuts. The View menu contains options to select which trace the marker follows. If the selected trace is currently hidden from view the marker will follow another trace in the following priority: data, average, maximum. In other words, if the data trace is selected, but not displayed, the marker will follow the average trace, and so forth.

The view can be changed from Frequency View to Channel View by clicking on "Frequency [MHZ]" or "Wi-Fi Channel" directly beneath the graph. In Frequency View the horizontal axis of the data display is labeled with frequency in MHz. In Channel View the horizontal axis is labeled with the Wi-Fi channel numbers centered at the midpoint of each channel's frequency range. When the mouse pointer is held over a channel number the frequency range for that channel is lightly highlighted. Clicking the channel number permanently highlights the frequency range for that channel. Clicking the

channel number again will remove the highlight. Wi-Fi channels 12-14 are only available in certain locations outside of North America. The color scheme can be changed or edited from the Edit? Preferences? Color Scheme tab. Keyboard shortcuts can also be edited on the Edit? Preferences? Keyboard Shortcuts tab.

6. Spectrogram View ( )

The spectrogram view provides a time-based history of the 2.4 GHz ISM Band capable of displaying two minutes to twenty four hours of data. Each horizontal data line represents either the average or the maximum amplitude of each frequency over a time segment. The spectrogram is color-coded to show amplitude, with low amplitudes shown in shades of blue; medium amplitudes are shown in shades of green, yellow, and orange, and high amplitudes shown in shades of red. All spectrogram settings can be adjusted on the Edit? Preferences? Spectrogram tab.

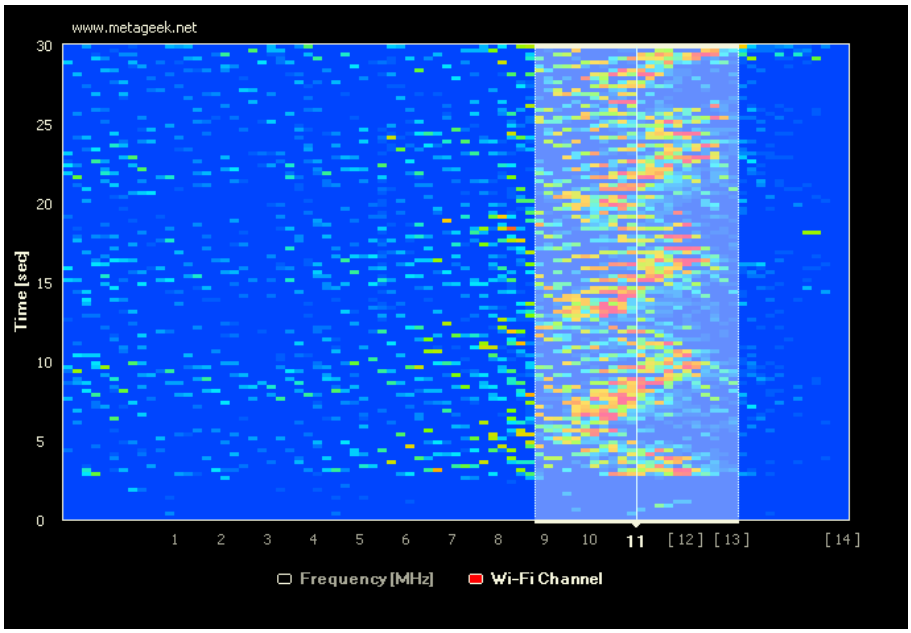

Figure 2 Spectrogram of Microwave

7. Saving Data

Wi-Spy has several options to save your data for further analysis or presentation. Static images of the data graph can be saved or actual data can be recorded for future playback.

Saving Images

The Wi-Spy graph may be printed, saved, or copied to the clipboard. It is recommended that Wi-Spy be stopped before printing, saving, or copying to the clipboard (To stop Wi-Spy press the Stop button in the toolbar). The graph can be saved in the following formats: .bmp, .gif, .jpg, and .png. The *PrintBW* and *PrintColor* color schemes are optimized for printing.

Recording Data

Real-time Wi-Spy data can also be saved to a file for replay at a later time. To make a new recording click the Create New Recording Session ( ) button and select a file name, description, and location. By default, files are saved in C:\Program Files\MetaGeek\Wi-Spy\Recordings. After completing the recording, deselect the New Recording button to end the recording.

Playing Back Recorded Data

To open a recorded file click the Open Recording ( ) button and select the desired file. Recorded files are opened in a new tab; you can switch back and forth between tabs to compare data traces. Recorded data can be stopped, fast forwarded, or rewound, as needed for viewing. Sample recordings are included in the Wi-Spy installation and can be found in C:\Program Files\MetaGeek\Wi-Spy\Recordings.

8. Common 2.4 GHz Devices

Most electronic devices that contribute interference in the 2.4GHz frequency band have a recognizable signature. Prerecorded samples of some common 2.4 GHz devices are included in the C:\Program Files\MetaGeek\Wi-Spy\Recordings directory, including: 2.4GHz cordless phone, microwave oven, Wi-Fi file transfer, Wi-Fi streaming audio, and Bluetooth.

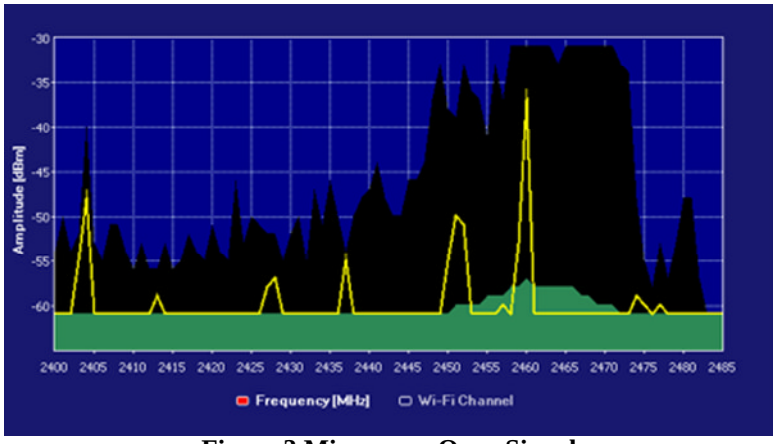

Figure 3 Microwave Oven Signal

Microwave ovens typically cause heavy interference across the top half of the 2.4 GHz band, with mild interference across the bottom half of the band as shown in the figure above.

Active Wi-Fi will generate a signal approximately 22 MHz in a bell-shaped pattern as shown below. The data trace (shown in yellow) will usually contain 1-5 narrow peaks spread across the 22 MHz signal.

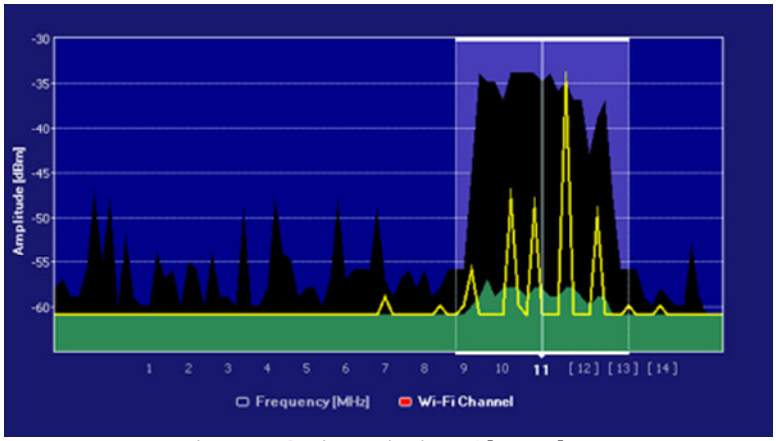

Figure 4 Active Wi-Fi on Channel 11

There are no standards for 2.4 GHz cordless phones, so phones from different companies (and sometimes even phones from the same company) will behave very differently. This figure on the left below shows a signal from a Siemens 2.4 GHz cordless phone. This phone hops frequencies quickly to spread its signal across the entire band over a short period of time.

Some 2.4 GHz cordless phones do not hop frequencies; instead they use a single channel (typically ~6 MHz wide). These phones usually have a “channel” button on the phone to change channels if the current channel has interference. The figure on the right below shows the signal from a Panasonic GigaRange 2.4 GHz phone. This phone transmits continuously on a 6 MHz-wide channel; the channel can be changed by pressing the ‘channel’ button on the phone.

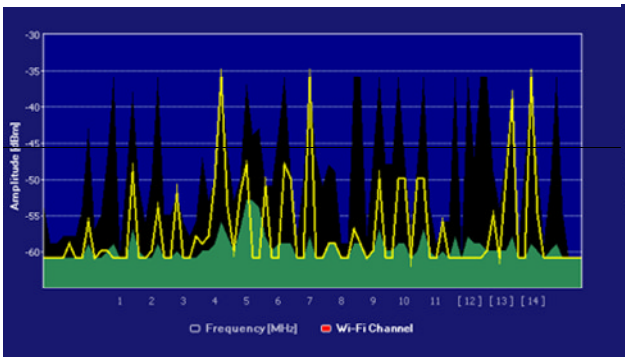

Figure 5 Frequency Hopping Cordless Phone

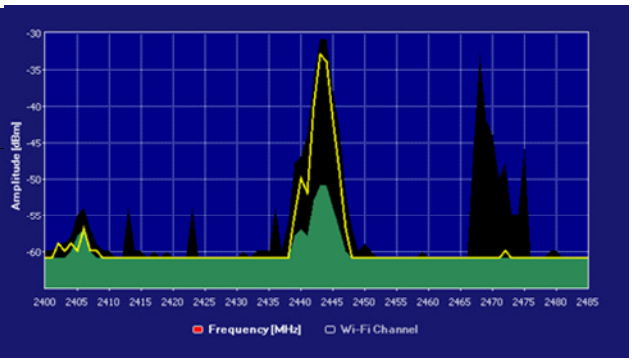

Figure 6 Non-Hopping Cordless Phone